Translation

PCT/EP2003/011948

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference 10 520	FOR FURTHER ACTION See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)	
International application No. PCT/EP2003/011948	International filing date (*day/month/year*) 28 October 2003 (28.10.2003)	Priority date (*day/month/year*) 31 October 2002 (31.10.2002)
International Patent Classification (IPC) or national classification and IPC C07C 5/333, 11/06		
Applicant UHDE GMBH		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.

2. This REPORT consists of a total of 5 sheets, including this cover sheet.

☐ This report is also accompanied by ANNEXES, i.e., sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

These annexes consist of a total of _____ sheets.

3. This report contains indications relating to the following items:

- I ☒ Basis of the report
- II ☐ Priority
- III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- IV ☐ Lack of unity of invention
- V ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- VI ☐ Certain documents cited
- VII ☐ Certain defects in the international application
- VIII ☐ Certain observations on the international application

Date of submission of the demand	Date of completion of this report
18 May 2004 (18.05.2004)	28 June 2004 (28.06.2004)
Name and mailing address of the IPEA/EP Facsimile No.	Authorized officer Telephone No.

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International Application No.
PCT/EP2003/011948

I. Basis of the report

1. With regard to the **elements** of the international application:*

☐ the international application as originally filed

☒ the description:

pages 1-8, as originally filed
pages _____, filed with the demand
pages _____, filed with the letter of _____

☒ the claims:

pages 1-9, as originally filed
pages _____, as amended (together with any statement under Article 19
pages _____, filed with the demand
pages _____, filed with the letter of _____

☒ the drawings:

pages 1/2-2/2, as originally filed
pages _____, filed with the demand
pages _____, filed with the letter of _____

☐ the sequence listing part of the description:

pages _____, as originally filed
pages _____, filed with the demand
pages _____, filed with the letter of _____

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.
These elements were available or furnished to this Authority in the following language _____ which is:

☐ the language of a translation furnished for the purposes of international search (under Rule 23.1(b)).

☐ the language of publication of the international application (under Rule 48.3(b)).

☐ the language of the translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

☐ contained in the international application in written form.

☐ filed together with the international application in computer readable form.

☐ furnished subsequently to this Authority in written form.

☐ furnished subsequently to this Authority in computer readable form.

☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.

☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. ☐ The amendments have resulted in the cancellation of:

☐ the description, pages _____

☐ the claims, Nos. _____

☐ the drawings, sheets/fig _____

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).**

** Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rule 70.16 and 70.17).*

*** Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.*

INTERNATIONAL PRELI[redacted]ARY EXAMINATION REPORT

Intern[redacted] application No.
PCT/[redacted] 03/11948

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Claims	1-9	YES
	Claims		NO
Inventive step (IS)	Claims	1-9	YES
	Claims		NO
Industrial applicability (IA)	Claims	1-9	YES
	Claims		NO

2. Citations and explanations

The present application relates to a method for producing unsaturated hydrocarbons,

wherein, in a first step, a hydrocarbon, particularly a mixture containing alkanes, which can contain water vapor and essentially does not contain oxygen, is fed through a first catalyst bed in a continuous process, said catalyst bed having the usual dehydrating conditions,

liquid water as well as water vapor and an oxygen-containing gas are then added to the reaction mixture obtained in the first step, and

in a second step, the reaction mixture so obtained is fed through a second catalyst bed in a continuous process in order to oxidize the hydrogen and to further dehydrate the hydrocarbons.

Document US-A-4 599 471 (D1) represents the closest prior art and differs from the present application in that the reaction mixture obtained in the first step does not have water added to it for cooling in the liquid phase.

The objective technical problem is thus seen to be that of providing an improved method for producing unsaturated hydrocarbons. The solution is described in claim 1 and relates to cooling with water in the liquid phase.

According to document D1, the cooling is accomplished either indirectly by means of a heat exchanger or directly. In the second embodiment, a gas or a liquid is added to the stream to be cooled. The use of water in the liquid phase is not described. The third embodiment that can be found in D1 is a combination of indirect cooling and direct cooling, with water in the liquid phase being vaporized by the heat exchanger and the water vapor being admixed to the medium to be cooled (cf. column 6, lines 29-56).

Proceeding from document D1, it is not obvious to a person skilled in the art to consider using water in the liquid phase to cool the reaction mixture obtained from the first step. Not only is this simplified form of cooling more cost-effective in terms of equipment but selectivity to the corresponding end products is also increased, since it is possible to prevent overheating in the catalyst bed.

Therefore, the subject matter of claims 1-9 fulfills the criteria of PCT Article 33(2) and (3).